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not allowed to the neighboring peoples, such as the Otomacos or the Achaguas. The social and linguistic bonds seem to be strong enough to cause the Yaruros to recognize themselves as a distinct people.

FOODS

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In the llanos food is not plentiful except in and along the rivers; but the foraging activities of the Yaruros are restricted to the banks of the Capanaparo and Sinaruco Rivers for another reason. The hunting of land animals has practically stopped for fear that they will be accused by the ranchers of killing cattle. In recent years the activities of the crocodile hunters have ruthlessly destroyed the game, and since such hunters live on the country they have consumed a portion of the available quantity of game on which the Yaruros depended for a livelihood.

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In the dry season game is concentrated along the rivers and the water holes. It is considerably easier to hunt it then than in the rainy season, when it is dispersed over the plains. The turtle, which is found in great quantities in the waters of the Orinoco and its tributaries, suffers a yearly mass hunt and destruction which has its effect on the food supply of the Yaruros. It has been discovered that the turtle fat and eggs will produce a fine grade of oil which sells for a high price. The result is that the breeding grounds of the turtles become yearly a scene of great activity and destruction. No one knows how many thousands of turtles and turtle eggs are gathered and converted into this oil late in the month of April.

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The meat staple of the Yaruros is the *Crocodilus babu*, a small crocodile which grows to about 6 feet long. This animal is hunted daily and eaten in its entirety. Its meat is esteemed above that of any other animal. On the other hand, the cayman, sought for its hide, is not hunted as a rule by the Yaruros. Perhaps this meat is not as savory as that of the babu, but the Yaruros give the reason that the large crocodile represents a race of mankind to which they are related. So that although occasionally it may be hunted for the price that its hide may bring, it is never eaten and never hunted consistently.

[825]

Next to the crocodile, turtles, including the matamata and tortoise, are to be found broiling over the fires in every Yaruro camp, and if they are not broiling they can be seen in shallow pools of water with their forelegs tied to their hindlegs. In this way they can keep alive but cannot walk away. The armadillo is seldom obtained and other meats appear occasionally on the diet of the Yaruros. Fishing is resorted to when neither crocodiles nor turtles are obtainable. The caribe, which is the piranha of Brazil, is esteemed but little. The tonino, which can be seen gracefully playing in the water or can be heard snorting in the rivers at night, is never hunted. It also is

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136 thought to be related to the race of mankind. On the other hand, the
225 manatee is hunted occasionally. Birds are hunted but seldom, but the
262 meat of the iguana is prized. This animal is not found in great
[224] quantities, however, in the open plains.

The vegetable diet is somewhat more plentiful and varied. There
262 are no restrictions or taboos on what can be eaten. In the dry season
137 it is the potato-like changuango, which is gathered by the women and
[251] which is to be seen broiling over the fires at all times, and which is the only food which the Yaruros are able to keep for a few days by burying it in the sand. In the rainy season it is the chigua seed and the barbaco which form the basic foods. The following list includes most of the foods eaten by the Yaruros:

DRY SEASON

421 *Eggs.*—Terracai (small water turtle) (mostly in February), turtle (March,
262 April), galapago (tortoise—December), crocodile (cayman—February), babu
136 (December).
137 *Meats.*—Terracai, turtle, galapago, crocodile (babu), deer, chiguire (capibara), birds, iguana.

Vegetables.—Changuango (root found in the savanna), barbaco (root found in the forest, mostly in May), guapo (a root found in the forest), wild yam (found in the savanna and the forests), fruit of the macanilla palm, honey, hearts of palm (in April).

DRY AND RAINY SEASON

Fish.—(Local Spanish names) tapuara, caribe, toporo, tachiama, palumeta, pavon, cajani, temblador (electric eel).

RAINY SEASON

Meats.—Terracai, turtle, galapago, crocodile (babu), deer, chiguire, birds, iguana.

Vegetables.—Fruit of the moriche, chigua, barbaco.

PROPERTY

421 The Yaruros do not have much personal property. Nevertheless,
422 what each person possesses is respected scrupulously. This attitude is especially in evidence when, for instance, a visitor attempts to purchase such a thing as a pot. In my case I was forced to ask the men. In spite of any price that I might offer they never allowed themselves to give any kind of an answer to my offer. Instead they offered the explanation that the pots were the property of the women and, therefore, they had to be asked if they wished to sell them. My own property I left in camp often without anyone to watch over it, but never did I miss even a sheet of paper.

area is only such in reference to the presence of a given technology. The presence of such a technology is not guaranteed in any particular culture by any historical, evolutionary, geographical, or ecological necessity. Its presence may entail a particular historical explanation or a general evolutionary one. In any case, its absence entails the absence of the use of certain resources whose presence we can observe only in retrospect. 311

Other resource areas besides those utilized because of the presence of horticulture among the Yaruro become available by their possession of hunting, gathering, and fishing technologies, as well as recently acquired animal husbandry in the form of pig-herding. Hunter animals include deer, armadillo, capybara, paca, peccary (?), iguana, and a number of birds (see Table II, p. 4).[1] These are variously distributed spatially according to the specific ecological niches for which they are adapted. Thus deer are apparently usually found dispersed in the somewhat damper, low-lying savanas where grass is greener and water more available away from the scene of human activity. Armadillo are found distributed throughout the savana. Other species, however, such as the capybara, live near the edge of permanent waters, mainly the rivers. Alligators also live only in the rivers. The faunal carrying capacity of the savanas appears to be quite low in the Cinaruco llanos since foraging foods for larger game animals are sparse. It is important to note that not only is the overall carrying capacity governed by the minimum average food supply of the savanas in the florally more restricted dry season,[2] but the distribution of animals varies considerably from the wet to the dry season. In the latter, animals tend to cluster nearer the rivers or the widely dispersed water holes. Consequently, the locus of hunting must also shift seasonally (see Maps).[3] Savana hunting techniques are neccessarily different from those used in procuring food in the rivers, whether hunting alligators or capybara, or, of course, fishing. There is some seasonal variation in the locus of fishing, too, although this is much less marked on the Cinaruco than on the freely-flooding streams of the flatter, more north-easterly savanas of the Apure llanos. In the rainy season, fish move up the larger streams into somewhat shallower waters where more plant and insect food is available to them. However, they are apparently unable to move up smaller streams which often have rapids-like stretches interrupting their course. Thus fishing in the rainy seasons is directed towards the larger creeks and away from the smaller creeks and the river itself, where the water has become too deep for successful fishing since the fish are scarcer and more difficult to see in the deep, swift currents of winter. In respect to animal husbandry, recently introduced pigs are pastured anywhere in the savanas but preferably next to the village or quite a distance from it, in either case far from the nearest gardens (Sp. *conuco*, Y. *tadó*), an effort which is rarely successful, since the pigs, in their wisdom, are among the main predators on the garden crops. Gathering may be carried out in the dry or the wet savana depending upon the plant food to be gathered, or it may be carried out near the creeks especially for the fruit of the moriche palm. The rivers do not appear to be used in gathering.

224 137 [221] 226 133 231 [241] 222

[1] [See pp. 35-37, category 116 --Analyst]
[2] [See pp. 40-41, category 102 --Analyst]
[3] [for footnote, see p. 42; category 116 --Analyst]

182 First, through time, the gardens tend to radiate further and further
241 from any given residence point since, given the 13-year planting-fallow
361 cycle, plots near the village will be exhausted. Since the major garden resource areas lie in a crudely east-to-west direction, there will be a slow westward migration of the geographic center of garden activities, enough so that at some point, the village is suspended, as it were, among distant resource points (see Maps), and enhanced by the dispersed nature of the hunting and fishing, and to some extent the gathering, areas. If the "suspension" is weighted more in one direction than another, there will be some tendency either to move the village or to send out temporary or permanent branches of it, respectively in the form of work cottages in the swiddens or in larger long-term house groups which are intermittently occupied. This process is, in fact, easily observed among the Yaruro in existent and abandoned house and subsidiary village sites scattered over the whole territory. Similarly, the locus of gathering, so important in
● [221] summer, moves further and further from the village. This, together with the considerable shift to fishing and river-hunting in summer, as well as the need for water, causes an extensive seasonal transhumance to occur within the territory. These factors contribute to fissioning as well as to inhibiting the development of permanently located villages, let alone larger aggregations. Thus, with a radiating ecology, a degree of group dispersion and geographical mobility within the territory is to be expected and is indeed characteristic of the Yaruro.

512 Second, if one examines the location of all resources it will be seen that, taken together, they constantly enjoin a dispersal of the labor force in all directions, regardless of season, so that more or less equivalent quantities of labor are being used at the same time in many varying kinds of productive activity independently of each other — at the peripheries of the territory, in the areas between, or in the village centers themselves,
[462] where the women are constantly doing the significantly important work of
[252] converting otherwise unusable food resources, like raw, bitter manioc or uncooked corn, into edibles.

476 Third, it will be noted that none of the Yaruro technological processes require cooperative work, even when they may permit it, if it were so desired. On the whole, the productive activities might be described as dispersive of labor, whether it is individuals or small groups of twos or threes who go out to keep each other company. Even the work of preparing
[241] the swiddens is carried out individually, though two or three men may
[463] work as neighbors in what appears as a single plot. Further, the technology
[242] is such as to require no highly specific and difficult or esoteric skills. The most difficult skill to acquire is the knowledge of the soil types and appropriate planting procedures attached to each. Thus, each adult is in
462 a position to learn the inventory of technological knowledge appropriate
463 to his or her sex, and somewhat of that belonging to the other sex too, and to apply it by himself whenever he wants or must. A man, well-instructed in Yaruro technology, could probably subsist alone successfully for long periods of time. One divorced adult man, although he was largely fed by his

2: Leeds E-5 (1958)1961 SS19 Yaruro SS19

TABLE II

FOODS: THEIR GEOGRAPHICAL PROVENIENCES, TECHNIQUES AND SEASONS OF PRODUCTION; THE DIVISION OF LABOR IN PRODUCTION AND FOOD PREPARATION

Symbols: S,F W,S — summer, fall, winter, spring
M,F, — male, female
Q — evaluation of the quantitative importance of the food or raw material in Yaruro subsistence and productive activity: 5 — major staple or resource; 4 — major crop, but not a staple; 3 — important food (or other) resource, but a secondary crop; 2 — minor crop (or other resource) serving as a more or less regular but seasonal delicacy; 1 — mostly a delicacy for occasional enjoyment (very secondary resource)
ɣ — indicates both presence, and by doubling or tripling importance of crop or resource; three ɣɣɣ's do not necessarily mean "3 times as important as 1 ɣ", merely 'of outstanding importance".
/ — sporadically or slightly present
d-m — December to March; a — April; m-s — May-September; o-n — October to November.

Yaruro	Spanish	English	Location and Techniques	Season of Prod. S	F	W	S	Division of Labor Prod. M	F	Food Prep. M	F	Q
CROPS PLANTED:												
pue-ka'ra (1)	yuca amarga	bitter manioc	swiddens, cuttings, dibble	ɣɣɣ	ɣɣɣ	ɣɣ	ɣɣ	ɣɣɣ	ɣ	/	ɣɣ	5
1. p. tso-ka'ra	cachicamo	" (variety?)	as above									
2. p. a'punda"ki bi'tebeti"a	ceibita (?) (blanca)	" (light)	as above									
3. p. a'punda"ki-k'a'Ra	ceibita (?) (obscura)	" (dark)	as above									
'hurari"a-'pue	yuca dulce	sweet manioc	as above	ɣɣ	ɣɣ	ɣɣ	ɣɣ	ɣɣ	ɣ	·	ɣɣ	4
1. p. agoi'kwe	puma de huevo	" (variety?)	as above									
2. p. iki'kwe	pata de zamuro	" (variety?)	as above									
3. p. valenciana	valenciana	" (", introd)	as above									

(1) Phonetics: *ã* etc. = nasalized vowel, *ə* = mid central unrounded vowel, *čh* = palatal c., *y* = palatalized fricative; *R* = flapped r, *nʲ* = palatalized nasal continuant, as in English sing, *j* = palatalized affricate, as in English job.

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Yaruro	Spanish	English	Location and Techniques	Season of Prod. S d-m	F a	W m-s	S o-n	Division of Labor Prod. M	F	Food M	Prep. F	Q
pwɛ	maiz	corn, maize	swiddens, hills, dibble			≠≠≠	≠≠≠	≠≠≠	≠	≠	≠≠≠	4
1. pume'pwɛ	maiz yaruro	Yaruro corn	as above (3 mo., 1 ear/stalk)									
2. 'hamburu"apwɛ	maiz guahibo	Guahibo corn	as above (4 mo., 2 ears/ ")									
3. p. kwɛ"kwɛiɛ	maiz amarillo	yellow corn	as above (5 mo., 1 ear/stalk)									
'parate"ai-	plátano, topocho, banana	plantains, bananas	swiddens, machetes to cut, on specially prepared mounds, slips	≠?	≠?	≠≠≠	≠≠	≠≠	/		≠≠	4
1. p. 'ai	plátano	plantain	as above (raw or cooked)								≠	
2. p. wo'ko	topocho	plantain	as above (raw or cooked)								≠	
3. p. o'kwi	dos millos	banana	as above (raw or cooked)								≠	
4. p. ka'ru	?	plantain	as above (?)								?	
5. ecechu'mɛ p.	guineo (?)	plantain	as above (raw or cooked)								≠	
6. ka'mure	cambur	banana	as above (raw)									
hu'ra	name	yams	dry swiddens, dibble	≠?	≠?	≠	≠≠	/			≠≠	2
e'de	patilla	melons, pumpkins, squashes	swiddens dibble	≠≠	≠?	≠	≠≠	≠≠	/		≠≠	3
1. kwɛ"bohurariiɛle	"	water-melon	as above									
2. chumanile.	"	pumpkins	as above									
3. 'yako"da	"?	bottle gourd	as above									
chrni'à	caña	sugar cane	wet swiddens, dibble, machete	≠?	≠?	≠≠≠	≠≠≠	≠≠≠	≠	/		3
1. ch. mo'ta	caña ?	" (variety ?)	as above									
2. ch. bɛ'rebɛrɛi"a	caña blanca	white cane	as above									
	caña criolla	introd var.	as above									

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Yaruro	Spanish	English	Location and Techniques	Season of Prod. S d-m	F a	W m-s	S o-n	Division of Labor Prod. M	F	Food M	Prep. F	Q
'cɛtamɛ"kwɛ	name	yams	swiddens, dibble	✓?	✓?	✓	✓	✓✓	/		✓	2
ča"ri	batata	sweet potato	as above	✓?		✓?	✓	✓✓	/		✓	2
ô	ananá	pineapple	swiddens, dibble				✓	✓			/	1
ia	capucho	?	swiddens, ?				✓?	✓			1	?
cɛ'da (=cɛda"dakwɛ	ocumo (yauta)	xanthosoma	swiddens, dibble	✓?		✓	✓	✓			✓	2
(ôô'tɛa"nâ	ají	chili pepper	doubtful if raised on Cinaruco)									
FISHES CAUGHT:												
yagu'pe	agua dulce	?	rivers, caños, hooks, arrows	✓				✓		/	✓	2
e (='chamachi"to)	cachama	?	rivers, hooks, arrows	✓				✓		/	✓	1
gui'te	sardina	?	rivers, fish arrows, small hook	✓	✓	✓	✓	✓		/	✓	2
dap'we	guavina	?	caño fishhooks	✓			✓	✓		/	✓	?
ho'nô	palambre	?	rivers, caños, arrows, hooks	✓?		✓	✓	✓		/	✓	2
ip:'â	pinte tigre	?	rivers, caños, hooks	✓	✓	✓	✓	✓		/	✓	2
pa'chowćn"ti	bagre	catfish	rivers, caños, hooks	✓	✓	✓	✓	✓		/	✓	2
'meô"dakwɛ	viejita	?	as above	✓	✓	✓	✓	✓		/	✓	?
'chôânda-"ɲi	"	?	as above	✓	✓	✓	✓	✓		/	✓	?
ainda'ô	"	?	caños, hooks, sardine bait	✓	✓	✓	✓	✓		/	✓	?
aɲi'ri-ka"Rà	" negra	?	caños, hooks	✓	✓	✓	✓	✓		/	✓	?
u'ru-u'ru	de tierra	?	rivers, hooks	✓	✓	✓	✓	✓		/	✓	?
da're	pavón	?	rivers, hooks, sardine bait	✓	✓	✓	✓	✓		/	✓	?

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Yaruro	Spanish	English	Location and Techniques	Season of Prod. S d-m	F a	W m.-s	S o-n	Division of Labor Prod. M	Prod. F	Food Prep. M	Food Prep. F	Q
chu'me	"	?	rivers, caños, hooks, sardine bait, from platform	—				✓		/	✓	?
'yaka'ra	"	?	as above, also arrows	✓	✓	✓	✓	✓		/	✓	2
'Yopok'e''se	" colorado	?	rivers, caños, hooks	✓	✓	✓	✓	✓		/	✓	?
šš	caribe blanco	white piranha	rivers, arrows, hooks with especially heavy cord	✓				✓		/	✓	1
(hòde'cia	caribe	piranha	doubtful if caught on Cinaruco)									
(pu'pu	cajarro	catfish	doubtful if caught on Cinaruco)									
FRUITS, ROOTS, AND SEEDS GATHERED:												
t'o'cho	?	?	in mata from big tree, at foot	—				✓				1?
gu'te (cho'nó)	guayaba	guava	bushes and low trees, distant			✓		✓				1
t'u	fruta de moriche	miriti palm fruit	near caños in wet savana, from foot of trees			✓✓		✓			✓	2
'utam''be	?	?	?, from big tree (monte?)			—		✓		✓	?	?
tum'be	?	?	?, ?			✓						1
tom,to'ai	cordón	tassel (?)	?, from tall trees (prob monte)			✓		✓				1?
tokai'cho	cacafio	?	?, ?			✓						1?
turi''to	?	?	?, ?			✓						1?
ya'kol,	totumo	calabash	monte (?), picked				✓	✓?			✓?	3
ai'pe	changuango	?	wet savanas, digging stick	✓					✓✓		✓	3
cho'kai	guapo	?	monte, savana, digging stick	✓	✓	✓	✓		✓✓		✓	2

Yaruro	Spanish	English	Location and Techniques	Season of Prod. S d-m	F a	W m-s	S o-n	Division of Labor Prod. M	Prod. F	Food M	Prep. F	Q
ma"hikai	solu ??	?	savana, digging stick									1
ka'ta	changuanito savanero	?	as above									2?
po'ta	barbaco	?	monte, digging stick									3
gwe'je (=gwepe'ke)	chigo	? (seed)	near monte, big trees, ground									2
ge (=ke)	chigo	? (seed)	?, ? (as above?)									?
ANIMAL HUSBANDRY:												
o'bacia	marrano	pigs	savanas, herding (introd.)						/			3
oka'taro	gallina	chickens	dunes near houses (")						/			1
ANIMALS HUNTED:												
(ta)ha'rigu'ri(a'na)	oso hormiguero	giant ant eater?	savana, bow and arrow									4
ha'ri	baba	alligator	rivers, heavy barbed arrow									3
mbwa	venado	deer	savanas, lance arrow, gun									3
ci'do	chigüire	capybara	monte, river, " ", fish arrow									3
tapa'ta	conejo	rabbit	savana, fish arrow							?		1?
puri	lapa	paca	caño, monte, traps, all arrows							?	?	1?
ya'tatu"mi	iguana	water lizard	rivers, montes, fish arrow							?	?	1?
'ge"te	cachicamo	armadillo	savanas, traps, sticks, hand								/	2
'ipurime"ta	manto	?	savanas, traps, arrows							?	?	?

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Yaruro	Spanish	English	Location and Techniques	Season of Prod. S d-m	F s	W m-s	S o-n	Division of Labor M	Prod. F	Food M	Prep. F	Q
'yacru"te	picure	? (aguti?)	monte, caño, fish arrow	≠	≠	≠	≠	≠		?	?	?
'iku"ri	tortuga	tortoise	rivers, fishhooks; on Capanaparo, use detachable arrow	≠≠			≠	≠		?	?	2
poda'me	tevecal	terrapin?	rivers, fishhooks " "	≠≠			≠	≠		?	?	2
gola'me	morrocoy	boxturtle	mata, by hand - doesn't run	≠	≠	≠	≠	≠		?	?	1
ci'rida"me	galápago	river turtle	rivers, detachable arrow	≠≠			≠	≠≠		?	?	2
('hði-obɣe]"a	chácharo	peccary	doubtful if hunted on Cinaruco)									
(he'ri	manatí	manatee	doubtful if hunted on Cinaruco)									
BIRDS HUNTED:												
he'we	cotua negro	duck species	rivers, caño, arrows	≠				≠		?	?	1
hà'na	caretero	?	rivers, lakes, arrows	≠				≠		?	?	1
andu'ra	garza morena	grey heron	rivers, lakes, arrows	≠				≠		?	?	1
o'kara	garza blanca	white heron	lakes, arrows	≠				≠		?	?	1
'huidiga'ra	garza paleta	painted heron?	lakes, arrows	≠				≠		?	?	1
hue	gaviota (?)	?	lakes, arrows, bird arrow	≠				≠		?	?	1
'kwinchi"ni	perdiz	partridge?	savana, bird arrow (?)	≠				≠		≠	?	1-
hu'ru-yu'ru	pavo	curassow	rivers, monte, arrows	≠	≠	≠	≠	≠		≠	?	2
u'ra	jivaro (?)	jivaro stork?	lakes, arrows, shotgun	≠				≠		≠	?	2?
noraha'te	pato real	duck species	lakes, arrows	≠≠				≠		?	?	?

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Yaruro	Spanish	English	Location and Techniques	Season of Prod. S d-m	F a	W m-s	S o-n	Division of Labor Prod. M	Prod. F	Food M	Prep. F	Q
pe'be	cafua	duck species	rivers, caños, arrows	✓✓	✓	✓	✓	✓✓		?	?	2?
pou'ni	pato	duck species	doubtful if hunted on Cinaruco)									
MISCELLANEOUS MATERIALS COLLECTED FOR USE IN PRODUCTION:												
ya'ru	capuruna	leaf to wrap and store corn sticks	savana, picking			✓?			✓		✓	1
karam'ba	?	cigar wrapping	savana, picking	✓	✓	✓	✓	✓?		✓	✓	1
ngam'bi	tabaco	tobacco	savana, picking	✓	✓	✓	✓	✓	✓	✓	✓	1
u'de	curagua, macanilla	macanilla palm	near caños (?) a) for bows, b) for string, fibres for objects	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓		✓ ✓	✓ ✓	2 2
chara'ro	salau (salado?)	canoe wood (?)	montes, for making canoes	✓	✓	✓	✓	✓✓		✓✓		4
ciñ'ro	caña brava	cane for arrows	near caños for foreshafts	✓	✓	✓	✓	✓✓		✓✓		4
ru	moriche	moriche	near or in caños, used for making House roofs, baskets, cords, fibres, hammocks	✓✓	✓✓	✓✓	✓✓	✓✓✓	✓✓	✓✓✓	✓✓✓	5
ngo	moriche frond	ditto	as above, often picked up from ground, or tree cut and fronds collected, last for years, may be reused.		as above							
biri'ro-i	guaraca	bark strips	montes, caños, for lashing	✓	✓	✓	✓	✓✓		✓✓		3
é-im'bu	cera de abeja	beeswax	near caños, from large trees	✓	✓			✓		✓		1
é'ke	miel	honey	as above	✓	✓			✓				
e'ra	peramán	tree wax	as above? for arrows	✓?	✓?			✓		✓		2

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[p.87]

and then shooting into the still side pools of a stream into which he has driven a post with bait attached. He may also stand in a canoe to shoot. It is reported, though I have not myself seen it, that barbasco (*Jacquinia revoluta* or *mucronulata*) poison is used by some Yaruro.[12] No nets, weirs, traps, sweeps, or artificial fish pools are used.

Given the techniques and tools of the Yaruro, all the subsistence activities described can conveniently be done by one person. Some *must* be done by one person only, since the tools and techniques themselves do not permit two or more persons to operate jointly. As it were, the logic of the tools and techniques concerned demands utilization by single persons.[13] Some of the tools and techniques might conveniently involve two or more persons, e. g. lashing tree trunks together to make a fence or cornering a capybara, but do not definitively *require* more than one person. Activities of all sorts may be done by aggregates of persons, each utilizing his own tools and techniques individually but neither the activity, the tools nor the techniques entail the aggregation of individuals. Thus, from the point of view of human organization, the technology, by itself, entails no managerial functions, no coordination of tasks which must be overseen by someone occupying an appropriately defined status.[14] That is, there are no technologically determined positions of leadership in Yaruro society. Further, the technology as such entails no significant cooperation in work organization, even when this is convenient, and correspondingly, no standard work groups or management functions, as represented in some defined status, for facilitating cooperation are to be expected or to be found. In fact, Yaruro technology and resource distribution are such as to elicit considerable dispersion of activities and actors at any given time of work, and to inhibit the development of rank and the personal acquisition of superordinating prestige.

IV

We may now examine the habitat aspect of the ecological relationship. A clearly marked annual cycle occurs in the Yaruro habitat.[15] However, despite a sharp seasonal change from heavy rains up to 60 inches in one half of the year to almost

[12] Personal communication from Mr. Thomas Rootes who has studied Yaruro linguistics for a number of months, having visited several groups.

[13] Different kinds of tools require different kinds of organization. A simple hand saw can be used by only one person at a time. A logging saw, though it can awkwardly be used by one person, is surely best used by two persons. Certain other saws, e. g. jig saws, make up one of a series of machine processes on a single part of a product, the entire series being the unit of operation which requires a still more complex level of organization. Cf. Leeds, 1960 b.

[14] For the structure of argument which is involved here, see Leeds, 1960 b.

[15] 'Habitat' here refers to all physical objects and conditions of the environment which are relevant to the existence or production of resources as defined by the culture. For the most part, then, 'habitat' refers to those environmental conditions such as humidity, temperature, insolation, rainfall, etc., which affect the food supply, as well as the food and water available for animals and plants and other culturally relevant physical objects. By extension, it refers to daily, seasonal, annual, and long-term variations and cycles in the various relevant factors of the environment, whether climatic, geologic, or biotic, which affect any of these supplies.

desert-like conditions in the other, temperature, sun, soil, and water-table conditions are such that plants will grow all year round, supplying a steady flow of vegetable foods to the people. The change of the water level in the rivers and in the water-table and the sharp increases and decreases of rain strongly affect the patterns of animal and plant life in the Yaruro environment. Annual cyclical variations in wind, humidity, and temperature are also quite marked. Plants and most especially animals, experience a kind of seasonal pulsation. As the rivers fill during the rainy season, the larger animals, such as the cayman, alligator, manatí, and dugong, move upstream to somewhat shallower waters, where their food supply is easier of access. Fish also move upstream and even up small brooks, where this is possible. If the savannas flood, many fish swim out into the savannas where numerous insects and other foods are now to be found. The insects themselves multiply and are distributed farther and farther back from the rivers as the rains progress and the savanna floods widen. Meanwhile, foraging animals move farther from the rivers and ponds, and range over greater distances as the rains and the elevated water-tables foster greater plant food resources. Insects in part follow the animals, in part the vegetation as it wakens to winter life in the interfluves. As the dry season begins to return, the reverse process takes place, and all life concentrates nearer and nearer the permanent waters such as the big rivers and some lakes, or at points where the land surface is near enough the permanent water-table to maintain some vegetation, notably the gallery forests and the woodlots, called *montes* in Spanish. Thus one may ideally describe a summer and a winter organization of the habitat. The incidence of resources varies accordingly, and consequently so do the technological activities and tasks to be done. In the dry season, there is a marked increase of gathering, particularly of roots and seeds which appear to store starches for dry season use in the wet season, whereas fruits appear mainly in the rainy season. Hunting increases in the dry season when animals are more highly concentrated in and near the rivers and tributary brooks and streams. Fishing also increases in the dry season as the waters become shallower, less grass-choked, and no longer laden with muds from upstream erosion which makes it impossible to see the fish. Garden production appears to decrease in summer as the dry season precludes growing some crops, such as pineapples, altogether, and reduces the possibility of growing sugar cane and corn.

Despite this marked seasonality, the habitat conditions of both seasons resemble each other in certain formal respects vital to our argument.[10] First, at any given moment of either season, from the point of view of work organization, the resources are what we may call dispersive. Thus, in mid-rainy season, swiddens are to be found dispersed along the streams and brooks flowing into the rivers and these adits are distributed irregularly over the land within a distance of 4—5 miles of the river. Even low slip-off slopes of the river may be used for growing sugar cane in the wet season, though they are too dry in the dry season. Game, such as tortoise, armadillo, deer, birds, and occasional other animals, are to be found throughout the savannas and about the river banks. Fish are found in most streams and in the rivers including those which have no useful banks for horticulture.

[10] Cf. Leeds, 1961, for further details and maps of the seasonal resource locations.

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Gathered resources are found near the streams in marshy places where the moriche palm grows, and to a lesser extent in the savannas.[17] The dry season resources are also distributively located though the pattern is somewhat different. Quanta of production from these resources at any one time are rarely great. The larder, as it were, must be filled from a number of sources at once, even though one crop, particularly bitter manioc, and occasionally sweet manioc and corn, may rise briefly to as much as 50 or 60% of the food supply. Thus the available quanta of resources and their distribution at given moments in time are such as to demand a distributive form of labor organization: workers, as individuals or in very small groups, must go off in different directions at the same time. The obverse of this, of course, is that no sizable or permanent working groups are to be expected and none in fact occur. Further, because a dispersion of the labor force and a constant flux in the constitution of work groups is entailed by the relationships between the technology and the habitat, organized and permanent managerial functions can scarcely occur, and no fixed status with significant managerial powers would be expected. The observed data of leadership among the Yaruro and many other tribes in South America and other parts of the world, such as Melanesia, having fundamentally similar ecologies, corresponds precisely with what one is led to expect logically from the form of the ecology.

The absolute size of work groups achievable in the Yaruro habitat is limited not only by the dispersed locations and temporal harvest patterns of resources, but also by the absolute productivity of the ecology. If one calculates the distribution per land area of those calories potentially convertible to human energy, the rate of calories per unit of land surface is so low that even at maximum utilization only a very low population density of about 2 persons per square mile would be possible. If concentrated in the center of an effective walking distance for exploiting resources of, say, six miles radius from a village, with a resultant total area of about 110 square miles, there would be about 220 souls. Of these, perhaps 70% (all persons over age 10), at maximum, might constitute the labor force, i. e. 154 adults and older children. The actual conditions are, of course, much more limiting, since the efficiency of the technology is such that it cannot exploit the totality of calories potentially available for conversion to human energy at any one time.[18] The actually harvested calories are considerably less, though I have no estimates as to how much less. Let us estimate half, or enough to support one person per square mile, that is, 110 persons. With a somewhat smaller per cent of the population available for the labor force, say 60% of the 110, the force would have only about 67 persons at most. This appears to be a reasonable number for the Cinaruco Yaruro groups, although due to depopulation from disease and mas-

[17] *Ibid.*, Map I.

[18] *Ibid.*, Map II.

[19] For example, all the fish available in the streams at a given time cannot be caught. More could be caught with an improved technology, such as the use of fish traps, weirs, or fish poisons, which, as we have said, are absent from the technology of the Cinaruco Yaruro. Density of fish, or any other biotic population, can be estimated (cf. Dice, 1952, Ch. IV), and then compared with rates of harvesting. Furthermore, it should be noted that often the totality of an actually harvested resource may not be available. For example, in

221 262 Finally, the Yaruro deny any considerable long-term oscillations in the environment and consequently in the resources. The extremes, particularly the minima, of habitat factors which regulate food and population balances, according to Liebig's Law, fall within narrow limits and again elicit no special institutions of management or of equilibrium maintenance to compensate for them, as in the case of the potlatches of the Northwest Coast of America, the buffalo hunts in the Great Plains of the United States, or the use of pigs in Melanesia.[22]

VI

868 One more point may be made regarding the ecology as limiter of chieftainship among the Yaruro. The tools, techniques, and resources require no very extensive, highly specialized or esoteric knowledge. In fact any man or woman, and any child as well, has access to such knowledge, and it is easily acquired by all members of the society who thus have, at least potentially, equal access to control over the means of life. There is no specialized knowledge, at least with respect to technology and habitat, which requires a specialized repository in the form of a chief or learned person. Yaruro knowledge, itself dependent upon the inventory of tools, techniques, and resources, inhibits any tendency towards the development of any [463] sort of specialists in technical or managerial knowledge. As one might expect, there are no true specialists in Yaruro society. Here and there women make pots and certain women seem to have a special bent for making woven sacks but these [756] are not properly specialities. Nor, from a technological or ecological point of view, is male or female shamanism in any way a speciality. They do not appear to be specialists even in esoteric knowledge. Knowledge of the general type described here might be called 'dispersive' or 'egalitarian' since it tends to become more or less uniformly distributed among the members of the society. A consequence of the existence of this type of knowledge, associated with the kind of technology described, is that there will be no specialised training of any specialists and, of course, no specialised personnel to do such training. This is the situation which obtains among the Yaruro both with respect to technical and managerial activities. Thus, in Yaruro knowledge, there is no source for the support of an institutionalized and strong chieftainship.

VII

221 241 361 622 In one respect, the ecology encourages chiefly functions. A balance is struck between the cultural resources, the possibilities that the habitat affords for their production, and the length of time that areas of land can be exploited. This is particularly true of the horticultural lands since they can no longer be used after three years of cropping, and it becomes necessary to move on. The result is that there is a slow migration of resource areas, chiefly of horticultural areas across the tribal territory. The lands in cultivation move further and further from any given village until a point of suspension is reached at which the walking and working

[22] Cf. Suttles, 1960 a, 1960 b; Llewelly and Hoebel, 1941; Vayda, 1961; Vayda, Leeds, and Smith, 1961.

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distance of the gardens is too far from the village for effective or efficient exploitation. At this point a village or part of a village must move. Moving the villages involves decision-making with respect to time, new location, and so on. Plainly, moving a village involves a community decision. A community institution for handling the decision-making is necessary. Technologically speaking, the moving itself is not a community task and does not involve supervision and direction. Therefore, one would not expect the institution of decision-making to be a directive one, but a consultative one. Again this corresponds to the observed modes of action of the Yaruro chiefs. The chiefs' function is to facilitate the formation of the decisions of the community by funnelling and interpreting individuals' feelings and expressions to the rest of the members of the community.

In sum, I have presented a model of a form of ecology which, hypothetically, determines the limits within which any sort of chiefly functions may operate. This model, again hypothetically, is applicable to all cultures having the kind of technological and habitat characteristics and forms of surplus here described. I think the model applies particularly to cultures which grow root-crops such as manioc, which utilize no labor-concentrative techniques, such as irrigation, and for whose food resources notable seasonality is absent. Such cultures have been noted widely in tropical South America and also in Melanesia. In both areas, chiefly functions are notably limited as contrasted, say, with Circum-Caribbean corn-raising cultures with some irrigation and other intensive techniques[24] and with Polynesian high cultures with elaborate irrigation and other public works.[25] It should be noted, first, that the Yaruro were not far from these Circum-Caribbean chiefdoms and even show a number of trait similarities, and, second, that the Yaruro have been under Spanish acculturation, which has involved encouragement of chiefly functions, for probably 250 years. Yet, despite the pressures of both diffusion and acculturation to produce a more developed chieftaincy, the attenuated form described persists. The explanation of this persistence seems to me to be ecological. I suggest that the model of explanation presented here is based on a set of analytic dimensions — the characteristics of the technology, those of the habitat, those of the harvest surplus, and the interrelationships of these — which may be used for all cultures, but whose formal, systemic relations vary from culture to culture, or class of cultures to class of cultures, thus giving different models for different cultures or classes of cultures. By using such dimensions, one can account for cultural differences by means of a standard set of principles, thus faciliating genuine comparisons and generalizations.

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[24] Cf. Sturtevant, 1961; Reichel-Dolmatoff, 1961.
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